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| 10/631,283 | 07/31/2003 | Cesar M. Garza | SC12879TP | 2618 |

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EXAMINER

BARRECA, NICOLE M

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1756

DATE MAILED: 08/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/631,283

Applicant(s)

GARZA ET AL.

Examiner

Nicole M. Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 13-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/31/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election of Group I, claims 1-12 in the reply filed on 7/15/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 13-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 7/15/05.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 6, 10 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuchiya (US 5,536,603).
5. A chrome layer is formed on quartz substrate 1 and light shielding film patterns 3 are formed (predetermined conductive layer). Resist patterns 4 are formed on the substrate and the surfaces are subjected to plasma treatment by the same method as described with reference to Fig.9A. The substrate is inserted into a vacuum chamber of a plasma generation device and carbon tetrachloride gas is introduced into the chamber. Energy is applied to generate fluorine (F) plasma and provide fluorine on the surface of the resist patterns 4. In another embodiment light-shielding pattern includes

chrome film 3a and chrome oxide film 3b. Photoresist is applied to form resist layer 4.

The resist layer is exposed and developed to form a pattern. The quartz substrate including the resist layer is dipped into a silicofluoric acid solution. See col.7, 49-57; col.8, 14-25; col.9, 26-46.

6. Claims 1, 2, 6, 8, 9 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsioh-Lien Ma (US 4,187,331).

7. A resist image layer is formed on the oxidized surface (predetermined insulating layer) on a silicon semiconductor wafer. The exposed layer was developed and placed in an IPC plasma reactor. The samples were treated in a fluorine containing atmosphere. Suitable compounds for forming the fluorine containing atmospheres include SF₆. See abstract, col.2, 7-65 and col.3, 20-59.

8. Claims 1, 2 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Blasko (US 5,912,187).

9. Patterned photoresist layer 12 is formed over a polysilicon layer 10, which is formed over a substrate 14. The exposed photoresist 12 is implanted with fluorine ions. See col.2, 28-col.4, 6.

10. Claims 1, 2 and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Shao (US 6,080,530).

11. A photoresist is applied over an antireflective layer and patterned. The resist pattern is transferred to the antireflective layer by exposure to plasma etching using gases known in the art, including F₂, SF₆ and their admixtures with N₂, Ar and He (col.7, 7-24).

12. Claims 1, 2, 6, 8, 9 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Chien (US 5,701,869).

13. Fluorinated photoresist layers are used in the manufacture of integrated circuits, including field effect and bipolar transistors (col.5, 27-40). Patterned first photoresist layers 26a, 26b and 26c are formed over first IMD layer 24 (predetermined insulating). The fluorinated photoresist layer is fluorinated through a reactive ion etc (RIE) plasma etch method employing a fluorine containing plasma etchant (col.5, 1-15). The fluorine containing plasma etchant is preferably fluorocarbons or nitrogen trifluoride (col.7, 50-col.8, 52). An oxygen containing plasma etch is performed to remove the patterned first fluorinated surface photoresist layers 26a", 26b" and 26c", thereby etching the photoresist to a smaller dimension (col.9, 18-67).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chien as applied to claim 2 above, and further in view of Vasconi "193 nm Meteorology: facing severe e-beam/resist interaction phenomena".

16. Chien is silent on the further use of a scanning electron microscope to measure the dimension of patterned photoresist. Vasconi teaches that CD-SEM inspection is standard in the lithography art (p.653). The reference also teaches that resist CD

variation can be reduced by optimization of the SEM set up conditions, including electron landing variation, probe current and magnification (p.657). It would have been obvious to one of ordinary skill in the art to use a SEM to measure the dimension of patterned photoresist and have the dimension substantially unchanged by the e-beam of the SEM in the method of Chien because Vasconi teaches that CD-SEM inspection is standard in the lithography art and that resist CD variation can be reduced by optimization of the SEM set up conditions, including electron landing variation, probe current and magnification.

17. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya.

18. Tsuchiya teaches exposing the patterned resist to fluorine using a liquid but does not disclose the specific fluorine containing liquids as claimed. However the choice of the specific fluorine containing liquid used to expose the photoresist would be dependent on the conditions of each individual manufacturing process, including the type of photoresist used and subsequent processing steps required for the specific device being manufactured such as etching, ion implantation and inspection. It would have been within the ordinary skill of one in the art to determine the requirements for the fluorine containing liquid, as dependent on the conditions of the individual manufacturing process and to choose the specific fluorine containing liquid, such as those as recited in claim 11, as required.

Double Patenting

19. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

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unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

20. Claims 1, 2, 6, 8 and 9 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 and 38-41 of copending Application No. 10/779,007. Although the conflicting claims are not identical, they are not patentably distinct from each other. Both sets of claims recite limitations which include forming a semiconductor device by providing a substrate, forming a layer on the substrate, forming a patterned photoresist on the layer and exposing the patterned photoresist to a gaseous fluorine compound such as atomic and molecular fluorine.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

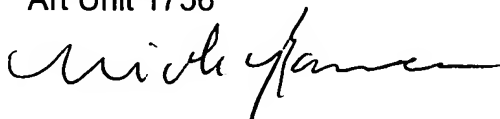
21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M Barreca
Primary Examiner
Art Unit 1756



8/25/05